

## WHAT IS CLAIMED IS:

1. A multiplex power steering device for a wheeled vehicle, comprising:

5 a steering mechanism through which movement of a steering wheel is transmitted to steered road wheels of the vehicle to steer the same;

a plurality of actuators that are connected to the steering mechanism to assist a steering operation effected by the steering mechanism;

10 a sensor that detects a physical value that has a connection with a control of the steering mechanism;

a control unit that outputs a control signal in accordance with the physical value detected by the sensor; and

15 an output distributor that distributes the control signal to all of the actuators,

wherein the control unit comprises a feedback computing part which includes:

20 an operating force estimating section that, by analyzing an output from a controlled system of the actuators, estimates an output of the actuators;

a disturbance estimating section that, by comparing the control signal actually fed to the actuators and the estimated output of the actuators, estimates a disturbance applied to the controlled system from the exterior; and

25 a disturbance compensating section that adjusts the control signal in a manner to remove the estimated disturbance therefrom, and

wherein the control unit calculates the control signal on the assumption that the actuators constitute a single actuator.

30 2. A multiplex power steering device as claimed in Claim 1, in which the output distributor includes a deviation adding section which intentionally adds a deviation to the control signal when

the control signal from the control unit is distributed to the actuators and in which the control unit is configured to compare the added deviation with an adjusting value provided by the feedback computing part to identify the actuator which is under malfunction.

3. A multiplex power steering device as claimed in Claim 2, in which the control unit is configured to carry out:  
adding different deviations at the deviation addition section to the control signal fed to the actuators when the adjusting value provided by the feedback computing part exceeds a given value; and  
comparing the adjusting value provided by the feedback computing part and the added deviation for detecting one of the actuators which is under malfunction.

4. A multiplex power steering device as claimed in Claim 2, in which the control unit is configured to carry out:  
adding a deviation at the deviation addition section to the control signal fed to one of the actuators when an adjusting value provided by the feedback computing part exceeds a given value;  
comparing the adjusting value provided by the feedback computing part and the added deviation for judging whether the actuator to which the control signal added with the deviation is under malfunction or not; and  
applying the above-mentioned two steps to the control signal fed to the other actuators to identify the actuator which is under malfunction.

5. A multiplex power steering device as claimed in Claim 2, in which the control unit is configured to add, at the deviation adding section, the deviation to the control signal in such a

manner that a value of the deviation is gradually increased to a needed value.

- 5 6. A multiplex power steering device as claimed in Claim 2, in which the control unit is configured to carry out the process for identifying the actuator under malfunction when an averaged value of the adjusting value provided by the feedback computing part for every given time is different from 0 (zero) by a given degree.
- 10 7. A multiplex power steering device as claimed in Claim 2, in which the control unit is configured to carry out the process of adding the deviation to the control signal when a steering angle of steered wheels of the associated vehicle is within a range
- 15 which includes an angular value that brings about a straight running of the vehicle.
- 20 8. A multiplex power steering device as claimed in Claim 2, in which the control unit is configured to carry out the process of adding the deviation to the control signal when an angular velocity of a steering wheel is within a range that includes 0 (zero).
- 25 9. A multiplex power steering device as claimed in Claim 2, in which the control unit is configured to carry out the process of adding the deviation to the control signal when a steering angle of steered wheels of the associated vehicle is within a range which includes an angular value that brings about a straight running of the vehicle and when an angular velocity of a steering
- 30 wheel is within a range that includes 0 (zero).
10. A multiplex power steering device as claimed in Claim 2, in which the control unit is configured to carry out:

removing an actuator under malfunction from the controlled system once the actuator is found to be under malfunction; and adjusting parameters handed by the feedback computing part once an actuator under malfunction is not identified.

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11. In a multiplex power steering device for a wheeled vehicle, which comprises a steering mechanism through which movement of a steering wheel is transmitted to steered road wheels of the vehicle to steer the same; a plurality of actuators that are  
10 connected to the steering mechanism to assist a steering operation effected by the steering mechanism; a sensor that detects a physical value that has a connection with a control of the steering mechanism; a control unit that outputs a control signal in accordance with the physical value detected by the  
15 sensor and calculates the control signal on the assumption that the actuators constitute a single actuator; and an output distributor that distributes the control signal to all of the actuators,

a method for controlling the actuators with the aid of the  
20 control unit, comprising:

estimating an output of the actuators by analyzing an output from a controlled system of the actuators;

estimating a disturbance applied to the controlled system from the exterior by comparing the control signal actually applied  
25 to the actuators and the estimated output of the actuators; and

adjusting the control signal in a manner to remove the estimated disturbance therefrom.

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